

REMARKS

Claims 70-100 are pending in the present application. In the Office Action dated May 26, 2005, claims 70, 71, 85, 86, and 90 were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,106,728 to Iida et al. ("Iida"). Claims 72, 75, and 76 were rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Iida. Claims 73, 74, 77-84, 87-89 and 91-100 were rejected under 35 U.S.C. 103(a) as being unpatentable over Iida.

The disclosed embodiments of the invention will now be discussed in comparison to the prior art. Of course, the discussion of the disclosed embodiments, and the discussion of the differences between the disclosed embodiments and the prior art subject matter, does not define the scope or interpretation of any of the claims. Instead, such discussed differences merely help the Examiner appreciate important claim distinctions discussed thereafter.

Figures 2 and 3 show a planarizing system 100 having a planarizing machine 110 and a slurry manufacturing assembly 200 in accordance with one embodiment. The slurry manufacturing assembly 200 is configured to form an abrasive slurry 242 having a bi-modal distribution of abrasive particles without having the deleterious problem of agglomeration of the abrasive particles. The slurry manufacturing assembly 200 includes a first supply container 210 containing a first solution 212 having a plurality of first abrasive particles and a second supply container 220 containing a second solution 222 having a plurality of second abrasive particles of a different type than the first abrasive particles. In this particular embodiment, the slurry manufacturing assembly 200 also includes a first particle removal unit 230 coupled to the first container 210, a second particle removal unit 235 coupled to the second container 220, and a mixing unit 240 coupled to the first and second particle removal units 230 and 235. As explained below, the first and second particle removal units 230 and 235 may be first and second filtration units that separately filter selected abrasive particles from the first and second solutions 212 and 222 such as, for example, agglomerated particles. The filtered first and second solutions 212 and 222 are then combined in the mixing unit 240 to form the abrasive slurry 242 for planarizing the substrate assembly 12 on the planarizing machine 110. The abrasive slurry 242 is

formed of the first and second solutions 212 and 222 and includes the first and second abrasive particles.

The Examiner has cited Iida. In contrast to the Applicant's embodiments, the apparatus and method taught by Iida, is designed for recycling a single particle slurry. The objective of the apparatus and method taught by Iida, is to recover useable particles in the singlet particle slurry, after it has been used for planarization. The problems solved by Iida are (1) to remove large debris (called dross in Iida) from the previously used solution that results from the planarization process, the debris being larger than the abrasive particle sizes, (2) to remove silicon dioxide ions formed in the used slurry that alters the properties of the planarization slurry, (3) to reestablish the proper pH of the planarizing slurry, and (4) to reestablish the proper particle concentration before re-using the recycled slurry for planarization.

To accomplish these goals, Iida teaches passing a previously used planarizing slurry through one filter that removes dross particles. The filtered solution is then passed through an ion capturing filter that removes silicon dioxide ions and other ions. The filtered and deionized solution is then passed to a vessel where the pH of the slurry is monitored and adjusted back to the pH of the original solution. The filtered, deionized and pH adjusted solution is then mixed with a concentrated solution of particles of the same size as the original planarizing solution to restore the recycled solution to the same particle concentration as the original solution. Finally, the filtered, deionized, pH adjusted and re-concentrated slurry is treated to another filtration step that removes particles greater than 0.5 microns, making the singlet abrasive slurry solution ready for reuse. In the embodiment illustrated in Figure 2, the pH adjustment, deionization and re-concentration steps are eliminated, leaving only the first and second filtration steps, however, the filtration steps still result in a flow of a particle slurry having a single type of particles.

Iida does not disclose or fairly suggest removing selected particles from a first set of abrasive particles to form a first flow of slurry, and combining the first flow of slurry with a second flow of slurry having particles of a different type than in the first treated flow of slurry.

Turning now to the claims, the patentably distinct differences between the cited references and the claim language will be specifically pointed out. As amended, claim 70 recites, in part, "a slurry manufacturing assembly including a first feed line for containing a flow

of a first solution having a plurality of first abrasive particles, a second feed line for containing a separate flow of a second solution having a plurality of second abrasive particles of a different type than the first abrasive particles, a first removal unit coupled to the first feed line to selectively remove a first type of selected abrasive particles from the first abrasive particles, and *a combination feed line operatively coupled to the first removal unit and the second feed line for containing a flow of an abrasive slurry after removing the first type of selected abrasive particles from the first solution, the abrasive slurry comprising the first and second solutions including the first and second abrasive particles*; and a slurry dispenser coupled to the combination line to dispense the abrasive slurry, the dispenser being positionable over the table to dispense the slurry from the combination line onto the planarizing pad.” (Emphasis Added). Thus, claim 70 has been amended to emphasize that the abrasive slurry that the dispenser can dispense onto the planarizing pad includes the first abrasive particles and the second abrasive particles of a different type than the first abrasive particles, and further that the apparatus is configured to remove a first type of selected abrasive particles from at least the first solution prior to forming the abrasive slurry.


The apparatus defined by claim 70 is configured so that the abrasive slurry, which includes the first solution and the second solution, can be dispensed onto the planarizing pad after a first type of abrasive particles has been selectively removed from the first solution. In addition, the abrasive slurry includes first abrasive particles and second abrasive particles of a different type than the first abrasive particles. As discussed above, Iida fails to disclose or fairly suggest the above limitations and, in fact, Iida teaches away from the invention of claim 70 because the apparatus of Iida is configured to dispense an abrasive slurry having only a single type of abrasive particle. Claim 90 is patentable for at least the same reasons.

Claims depending from claims 70 and 90 are also allowable due to depending from an allowable base claim and further in view of the additional limitations recited in the dependent claims.

All of the claims remaining in the application (claims 70-100) are now clearly allowable. Favorable consideration and a timely Notice of Allowance are earnestly solicited.

Respectfully submitted,

DORSEY & WHITNEY LLP



Marcus Simon
Registration No. 50,258
Telephone No. (206) 903-8787

MS:clr

Enclosures:

Postcard
Check
Fee Transmittal Sheet (+ copy)

DORSEY & WHITNEY LLP
1420 Fifth Avenue, Suite 3400
Seattle, WA 98101-4010
(206) 903-8800 (telephone)
(206) 903-8820 (fax)

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